

Engineering and Ethics – Avoiding the Gray Zone



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We will cover

- Definition of Ethics
- Engineering failures
- Codes of Ethics
- Professional Engineering laws & rules
- QBS
- Case studies
- Question and Answer



•How do you define Ethics and/or Ethical behavior?



Definitions

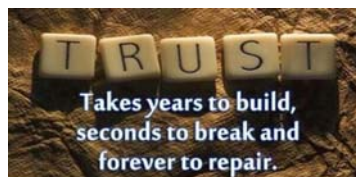
- ▶ **Trustworthy** – able to be relied on to do or provide what is needed or right: deserving of trust
- ▶ **Morality** – concept of right or wrong; individual conscience, codes of behavior
- ▶ **Integrity** – being honest and having strong moral principles; choice to uphold oneself to consistently moral and ethical standards
- ▶ **Ethics** – the science of human duty; body of rules of duty drawn from this science; rules of practice

Ethical Principles

- ❖ Do no harm – Health safety and welfare of public
- ❖ Area of competence
- ❖ Objective and honest
- ❖ Avoid conflict of interest
- ❖ Public and Profession above profit



Trust and Ethics



- ▶ A fundamental business concern
- ▶ Demonstrated by business practices
- ▶ “Well, it depends” = conditional ethics
- ▶ Gap between what people want to do and what they actually do

Only one ethic

•The Golden Rule

- “Treat others as you want to be treated”.



- There is a version of this standard in just about every Culture on the planet

Trust and Ethics

- “Doing the right thing may not always be easy – but it is always right”
- John C. Maxwell



Ethical Dilemma – The Gray Zone

1. We do what's most convenient
2. We do what we must to win
3. We rationalize our choices with
Relativism = situational ethics

• A change in the wind ?



Engineers as Ethical Leaders

- Do we have the will to follow it?
- Can we lead?

A leader is one who
knows the way, goes
the way, and shows
the way.

- John C. Maxwell



Ethical Conduct

- ▶ Work relationships
- ▶ Legal compliance
- ▶ Conflict of interest
- ▶ Bribery and kickbacks
- ▶ Confidential information
- ▶ Consideration of employer assets
- ▶ Moonlighting



•Black and white? Or gray?

Work Relationships

- ▶ Partnership between Client and Consultant to serve the best interest of the public
- ▶ Communication, expectations and tribulations
- ▶ Go to the field
- ▶ Know your contract
- ▶ Do your QA/QC



Business Choices

- ▶ Sarbanes–Oxley
- ▶ Taking care of clients
- ▶ Paying sub-consultants
- ▶ Recruiting staff
- ▶ Political contributions



Workplace Situations



- ▶ Respecting coworker privacy
- ▶ Taking home office supplies
- ▶ Use of mobile phones
- ▶ Time spent on the internet
- ▶ Computer licensing
- ▶ “Groupthink” of workplace

Failures change the future

- ▶ Johnstown Flood, PA 1889
- ▶ Quebec Bridge, Canada 1907 and 1916
- ▶ Boston Molasses Disaster, MA 1919
- ▶ St Francis Dam, CA 928
- ▶ New London School Explosion, TX 1937
- ▶ Tacoma Narrows Bridge, WA 1940
- ▶ Challenger Explosion, Florida, 1986
- ▶ Columbia Shuttle, TX/LA 2003

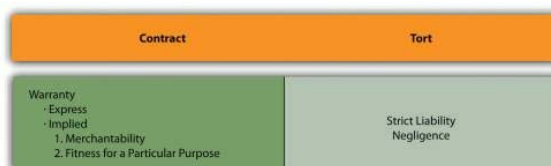


Johnstown Flood: May 31, 1889

- | | |
|---|--|
| <ul style="list-style-type: none"> • <u>Input</u> • Johnston pop. 30,000 • Cambria Iron Works • South Fork Dam privately owned, 14 miles upstream • Lowered for road on top • Previous owner removed discharge pipes • Rained 6-10 Inches in 24 hrs • 3 Telegraph warnings, not passed to authorities | <ul style="list-style-type: none"> • <u>Outcome</u> • 40 minutes to drain the lake • Hit Johnston in 57 min. • Trees, houses, animals, rail cars and barbed wire • Stone Bridge fire, 3 days • 2209 Fatalities, 99 entire families, 396 children • American Red Cross 1st major disaster effort- 5 months • Law change on liability |
|---|--|

Rylands v. Fletcher

- South Fork Fishing and Hunting Club modified the dam but were they negligent?
- By design, Club had few resources despite rich members, survivors unable to recover damages.
- *Rylands*: non-negligent defendant can be held liable for damage caused by the unnatural use of land.
- Foreshadowed of 20th century acceptance of strict liability.



Boston Molasses Disaster, 1919



- | | |
|--|---|
| <ul style="list-style-type: none"> • <u>Input</u> • Cylinder stress failure • 50 Ft tall, 90 Ft dia • Rivets “shot out” • Molasses 25 Ft high & 35 mph • Rapid temperature change/fermentation • Leaks – painted tank brown/free sweetner | <ul style="list-style-type: none"> • <u>Outcome</u> • 21 died, 150 injured • Questionable testing and construction – • Failure at MH at tank base • 1st class-action lawsuit in MA, took 3 years • Purity Distilling – claimed anarchists to blame |
|--|---|

New London School Explosion, 1937

- Input

- Rich school district - oil
- \$1 mil steel & concrete
- Tap into Parade Gasoline residue gas line – save \$\$
- Odorless & colorless
- Sparked by electric sander
- Heard for miles
- Aid – roughnecks, Texas Rangers, Boy Scouts
- Mother Frances Hospital

- Outcome

- 300 killed, 300 injured
- Texas legislature in session, established TBPE
- Mercaptans added to natural gas worldwide



Walter Cronkite

- One of his first assignments for the United Press
- He went on to covered World War II
- and Nuremberg trails



“I did nothing in my studies nor in my life to prepare me for a story of the magnitude of that New London tragedy, nor has any story since that awful day equaled it.”

More recent/relevant failures . .

- ▶ Minneapolis Bridge Failure, August 2007
- ▶ Dallas Cowboy Facility collapse, May 2009
- ▶ Argyle Athletic Facility collapse, April 2016



The Gray Zone?



- Allen HS Football Stadium
 - Opened Jan 2013, \$60 mil
 - Closed June 2014 – cracks on concourse
 - Repairs by original design & construction professionals
 - No one has accepted blame

Formal Codes and Standards

- **National Institute for Engineering Ethics**
- **American Society of Civil Engineers**
- **National Society of Professional Engineers**
- **APWA Standard of Professional Conduct**
- **Texas Board of Professional Engineers**



National Society of Professional Engineers



- Preamble
- Fundamental Canons
- Rules of Practice
- Professional Obligations –
 - Obligation to protect the health, safety and welfare of the general public
 - Putting professional interests above self-interests
 - Attain and maintain competence

American Society of Civil Engineers Code of Ethics

- Principles and Canons:
- **Canon #1** – Safety, health and welfare of public
- **Canon #2** – Perform only in area of competence
- **Canon #3** – Objective and truthful
- **Canon #4** – Act as faithful agents, avoid conflicts of interest
- **Canon #5** – Reputation on merit/fair competition
- **Canon #6** – Uphold honor, integrity and dignity of profession
- **Canon #7** – Continue professional development



Cowboy Code to Life

- Don't squat with your spurs on.
- If you find yourself in a hole, first thing to do is stop diggin'.
- If your ridin' ahead of the herd, look back every now and then to make sure it's still with ya.
- The easiest way to eat crow is while it is warm.
- Always drink upstream of the herd.
- If you get to thinkin' you're a person of some influence, try orderin' somebody else's dog around.



Even Pirates have a code



- Every man shall obey civil Command
- Keeping a secret or stealing is grounds for being marooned
- A man striking another man shall receive Moses' Law (39 stripes) on a bare back
- Endangering the ship with fire – Moses' Law
- Meddling with a prudent woman without her consent, shall suffer present Death

Texas Board of Professional Engineers



- ❖ A Law, not a Code
- ❖ Title 6, Regulation of Engineering; Chapter 1001. Engineer; Subchapter C: Professional Conduct and Ethics
- ❖ 60% of Complaints business ethics related
- ❖ Established the Murdough Center
- ❖ On-line ethics quiz measures knowledge of law and rules

State Codes of Conduct



- OK – Oldest law, 1907
- LA – Second State, 1908
- TX - 1937

- Common elements – Protect the public; objective and truthful; competent; confidentiality of client; responsible to the profession.
- Licensee and the Public relationship, not a code of ethics.



Advancing the Business of Engineering

• **Qualification Based Selection**

- ✓ Protects the public welfare – highly skilled service
- ✓ Protects the taxpayer – Engineering = 0.5 to 2 % of overall total project cost
- ✓ Benefits small firms – provides a forum demonstrating capabilities
- ✓ Promotes technical innovation – Owner defines project scope during the selection process

QBS – Qualification Based Selection

- QBS - procedure whereby service providers are retained on the basis of qualifications, rather than price factors.
- QBS vs Bid
- When is work Bid?
- When is work under QBS?
- What to do when they have it wrong.



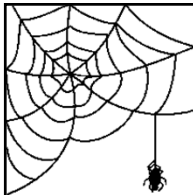
Case Study – TBPE Disciplinary Case: Going to the Field

- Foundation company hires licensed PE to verify foundation work done according to plan and properly constructed.
- Engineer writes and signs letter of verification
- Another Inspector trade discovers all is not well
- Foundation company refunds money
- What about the engineer?



Case Study – TBPE Disciplinary Case: Conflict of Interest

- On site at long term development performing CA services for Engineering
- Contractor makes request
- Licensee's actions
- Lawyer
- Board Action



Websites

- www.nspe.org/resources/ethics
- [NSPE You be the Judge Archive](#)
- www.niee.org
- www.asce.org/inside/codesofethics.cfm
- www.murdough.ttu.edu
- www.ethicsinstitute.com
- <http://onlineethics.org>

INSPIRATION

THE OPTIMIST EXPECTS IT
TO CHANGE. THE LEADER
ADJUSTS THE SAILS.

JOHN C. MAXWELL / @INSPIRINGTHINK



Question and Answer



The Whistleblowers

- Space Challenger – Bob Ebeling
 - One of five engineers who no-goed the flight
 - Grief and Guilt
 - Winner – cared and acted
- Hurricane Sandy – Andrew Braum
 - Changes to Engineers report
 - Lawsuits in progress